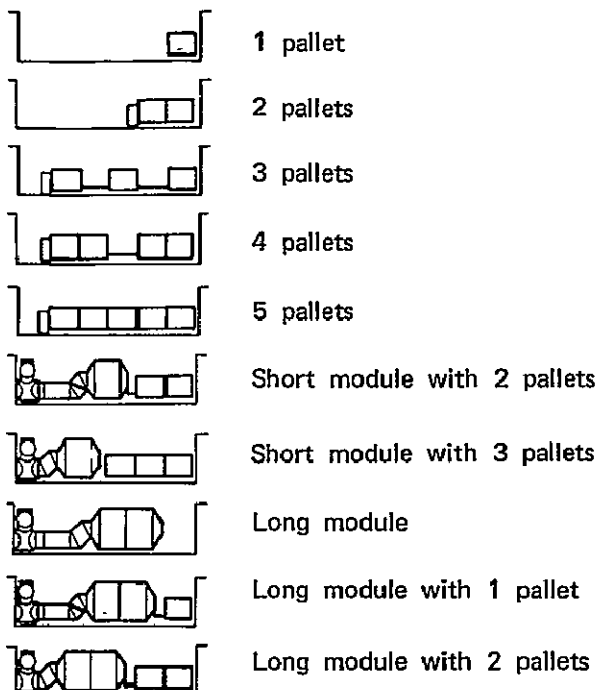


APPENDIX B

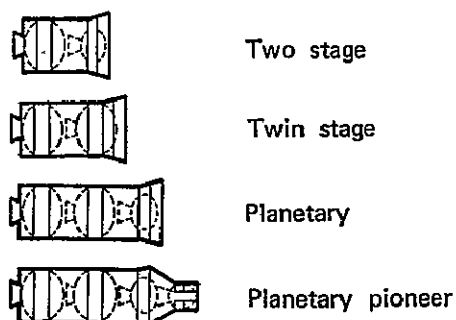
Forms

In completing the STS 100 form on the facing page, please use the following standard terms (if applicable) for payload configurations.

Spacelab module and pallet configurations



Interim upper stage configurations



Spinning solid upper stage configurations

Delta class

Atlas-Centaur class

STS 100 FORM	REQUEST FOR FLIGHT ASSIGNMENT	DATE:																																				
To: SPACE TRANSPORTATION SYSTEMS OPERATIONS MAIL CODE: MO NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WASHINGTON D.C. 20546	FROM: _____ _____ _____ _____ /S/																																					
FLIGHT OBJECTIVES:	<input type="checkbox"/> Earnest money <input type="checkbox"/> NASA approved <input type="checkbox"/> Commercial <input type="checkbox"/> ESA approved <input type="checkbox"/> Other Government <input type="checkbox"/> DOD approved																																					
Flight period _____ or specific date _____ FLIGHT TYPE: Inclination range _____ or specific inclination _____ <input type="checkbox"/> Deployment Altitude range _____ or specific altitude _____ <input type="checkbox"/> Attached Payload configuration _____ <input type="checkbox"/> Servicing Flight duration, hours attached _____ Discipline _____ <input type="checkbox"/> Retrieval Crew complement: Commander, pilot, mission specialist plus option for additional mission specialist(s) _____ or payload specialist(s) _____ Payload Operations Control Center support: <input type="checkbox"/> GSFC <input type="checkbox"/> JPL <input type="checkbox"/> JSC <input type="checkbox"/> Other <input type="checkbox"/> Not required _____ STDN and Tracking and Data Relay Satellite system support (comment):																																						
Payload mass properties including flight kits: <div style="float: right; text-align: right; font-size: small;"> Specify flight kits used in weight: (see JSC-07700, Volume XIV) </div> <table style="width: 100%; border: none;"> <tr> <td style="width: 10%;">Weight:</td> <td style="width: 30%;">Launch _____</td> <td style="width: 10%;">lb.</td> <td style="width: 30%;">_____</td> <td style="width: 10%;">kg</td> <td style="width: 10%;">_____</td> </tr> <tr> <td></td> <td>Landing _____</td> <td>lb.</td> <td>_____</td> <td>kg</td> <td>_____</td> </tr> <tr> <td>Diameter:</td> <td>Launch _____</td> <td>inches</td> <td>_____</td> <td>mm</td> <td>_____</td> </tr> <tr> <td></td> <td>Landing _____</td> <td>inches</td> <td>_____</td> <td>mm</td> <td>_____</td> </tr> <tr> <td>Length:</td> <td>Launch _____</td> <td>inches</td> <td>_____</td> <td>mm</td> <td>_____</td> </tr> <tr> <td></td> <td>Landing _____</td> <td>inches</td> <td>_____</td> <td>mm</td> <td>_____</td> </tr> </table> Payload kWh estimate _____ kWh Payload constraints and/or unique requirements: Orientation, pointing, sunlight constraints, etc. (comment): Special prelaunch and postlanding off-line support at launch and landing site (comment): Special prelaunch and postlanding on-line support while in the Orbiter (comment):			Weight:	Launch _____	lb.	_____	kg	_____		Landing _____	lb.	_____	kg	_____	Diameter:	Launch _____	inches	_____	mm	_____		Landing _____	inches	_____	mm	_____	Length:	Launch _____	inches	_____	mm	_____		Landing _____	inches	_____	mm	_____
Weight:	Launch _____	lb.	_____	kg	_____																																	
	Landing _____	lb.	_____	kg	_____																																	
Diameter:	Launch _____	inches	_____	mm	_____																																	
	Landing _____	inches	_____	mm	_____																																	
Length:	Launch _____	inches	_____	mm	_____																																	
	Landing _____	inches	_____	mm	_____																																	

Other comments:

Those organizations that will be non-U.S. Government users should also provide the following information:

- Do you request a dedicated flight? If so, do you intend to sublet services to other users?
- Do you request consideration in STS exceptional program selection process?
- Are you willing for your payload to fly on a space-available (standby) basis?
- Do you request your payload to be flown under the definition of a "small self-contained payload"?
- State desired date to begin contract negotiations.
- Does payload (or payloads) require revisit and/or retrieval services?
- List known optional services currently under consideration in order that flight requirements can be established.

Space Transportation System flight assignment

[STS User Handbook, May 1977]

Firm, tentative, and unassigned flights

Status	Government fiscal year (Oct. 1-Sept. 30)						
	'79	80	81	82	83	84	85
Total	3	6	13	23	42	56	60 → Continues at 60 per year
Firm	3	3	0	0	0	0	0
Tentative	0	0	0	0	0	0	0
Unassigned	0	3	13	23	42	56	60

Orbital flight test phase

Assigned flight number	Date	Launch site	User	Cargo	Flight objectives
1	Mar. 1979	KSC	NASA	Development flight instrumentation pallet	Orbital flight test
2	July 1979	KSC	NASA	Development flight instrumentation pallet; payload TBD	Orbital flight test
3	Sept. 1979	KSC	NASA	Development flight instrumentation pallet; payload TBD	Orbital flight test
4	Dec. 1979	KSC	NASA	Development flight instrumentation pallet; payload TBD	Orbital flight test
5	Feb. 1980	KSC	NASA	Development flight instrumentation pallet; payload TBD	Orbital flight test
6	Mar. 1980	KSC	NASA	Development flight instrumentation pallet; payload TBD	Orbital flight test

Operational buildup phase

Assigned flight number	Date	Launch site	User	Cargo	Flight objectives
7	May 1980	KSC			
8	July 1980	KSC			
9	Sept. 1980	KSC			
10	Oct. 1980	KSC			
11	Dec. 1980	KSC			
12	Jan. 1981	KSC			
13	Feb. 1981	KSC			
14	Mar. 1981	KSC			
15	April 1981	KSC			
16	May 1981	KSC			
17	June 1981	KSC			
18	June 1981	KSC			
19	July 1981	KSC			
20	Aug. 1981	KSC			
21	Sept. 1981	KSC			
22	Sept. 1981	KSC			
23	Oct. 1981	KSC			
24	Nov. 1981	KSC			
25	Nov. 1981	KSC			
26	Dec 1981	KSC			
27	Dec 1981	KSC			
28	Jan. 1982	KSC			
29	Jan. 1982	KSC			
30	Feb. 1982	KSC			
31	Feb. 1982	KSC			
32	Mar. 1982	KSC			
33	April 1982	KSC			
34	April 1982	KSC			
35	May 1982	KSC			
36	May 1982	KSC			
37	May 1982	KSC			
38	June 1982	KSC			
39	July 1982	KSC			
40	July 1982	KSC			
41	Aug. 1982	KSC			
42	Aug. 1982	KSC			
43	Sept. 1982	KSC			
44	Sept. 1982	KSC			

APPENDIX C

Glossary of terms

aft flight deck

That part of the Orbiter cabin on the upper deck where payload controls can be located.

airlock

A compartment, capable of being depressurized without depressurization of the Orbiter cabin, used to transfer crewmembers and equipment. A similar compartment in the Spacelab module is used to expose experiments to space.

announcement of flight opportunity

The process by which proposed investigations are solicited for a specific space flight.

announcement of flight periods

The process by which proposed investigations are solicited for space flight within a designated time period, but without a specific flight number identification. The flight period may include plans for one or more flights.

Atlas-Centaur class

Payloads weighing approximately 4000 to 4400 pounds (1800 to 2000 kilograms).

azimuth

True launch heading from KSC or VAFB measured clockwise from 0° north.

barbecue mode

Orbiter in slow roll for thermal conditioning.

beta angle

Minimum angle between the Earth-Sun line and the plane of the orbit.

capture

The event of the remote manipulator system end effector making contact with and firmly attaching to a payload grapple fixture. A payload is captured at any time it is firmly attached to the remote manipulator system.

cargo

The total complement of payloads (one or more) on any one flight. It includes everything contained in the Orbiter cargo bay plus other equipment, hardware, and consumables located elsewhere in the Orbiter that are user-unique and are not carried as part of the basic Orbiter payload support.

cargo bay

The unpressurized mid part of the Orbiter fuselage behind the cabin aft bulkhead where most payloads are carried. Its maximum usable payload envelope is 15 feet (4.6 meters) in diameter and 60 feet (18.3 meters) long. Hinged doors extend the full length of the bay.

cargo bay liner

Protective soft material used to isolate sensitive payloads from the bay structure.

cargo integration review

Part of STS planning process that results in a cargo manifest, cost per flight, and billing schedule.

cargo integration test equipment

Setup at KSC that can provide testing of both payload-to-payload and cargo-to-Orbiter interfaces.

certificate of compliance

Documentation prepared by the user confirming that a payload has successfully completed interface verification.

commander

This crewmember has ultimate responsibility for the safety of embarked personnel and has authority throughout the flight to deviate from the flight plan, procedures, and personnel assignments as necessary to preserve crew safety or vehicle integrity. The commander is also responsible for the overall execution of the flight plan in compliance with NASA policy, mission rules, and Mission Control Center directives.

common payload support equipment

Spacelab-provided mission-dependent equipment that consists of a top airlock and a viewport/window assembly.

core segment

Section of the pressurized Spacelab module that houses subsystem equipment and experiments.

crew activity planning

The analysis and development of activities to be performed in flight by the crew, resulting in a time line of these activities and reference data for each flight.

deadband

That attitude and rate control region in which no Orbiter reaction control subsystem or vernier correction forces are being generated.

deep space network

Communications network managed by the Jet Propulsion Laboratory for command and control of all planetary flights.

Delta class

Payloads weighing approximately 2000 to 2500 pounds (900 to 1100 kilograms).

deployment

The process of removing a payload from a stowed or berthed position in the cargo bay and releasing that payload to a position free of the Orbiter.

European Space Agency

An international organization acting on behalf of its member states (Belgium, Denmark, France, Federal Republic of Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, and the United Kingdom. The ESA directs a European industrial team responsible for the development and manufacture of Spacelab.

experimenter

A user of the Space Transportation System who ordinarily will be an individual whose experiment is a small part of the total payload.

experiment racks

Removable and reusable assemblies in the Spacelab module that provide structural mounting and connections to supporting subsystems (power, thermal control, data management, etc.) and experiment equipment.

experiment segment

Section of the pressurized Spacelab module that houses experiments and sensors.

external tank

Element of the Space Shuttle system that contains liquid propellant for the Orbiter main engines. It is jettisoned prior to orbit insertion.

extravehicular activity

Activities by crewmembers conducted outside the spacecraft pressure hull or within the cargo bay when the cargo bay doors are open.

extravehicular mobility unit

A self-contained (no umbilicals) life support system and anthropomorphic pressure garment for use by crewmembers during extravehicular activity. It provides thermal and micrometeoroid protection.

flight

The period from launch to landing of an Orbiter — a single Shuttle round trip. One flight might deliver more than one payload; more than one flight might be required to accomplish a single mission.

flight control team

An element of the MCC on duty to provide real-time support for the duration of each STS flight.

flight data file

The onboard complement of crew activity plans, procedures, reference material, and test data available to the crew for flight execution. There will normally be an STS flight data file for STS crew activities and also a payload flight data file for payload crew activities.

flight-dependent training

Preparation of a mission or payload specialist(s) for a specific flight, depending on the mission goals. Part of the training involves integrated simulations with the rest of the flight crew and ground teams.

flight design

The trajectory, consumables, attitude and pointing, and navigation analysis necessary to support the planning of a flight.

flight-independent training

Standard preparation of a mission or payload specialist for any flight.

flight kit

Optional hardware (including consumables) to provide additional, special, or extended services to payloads. Kits are packaged in such a way that they can be installed and removed easily.

flight manifest

The designation of a flight, assignment of the cargo to be flown, and specific implementing instructions for STS operations personnel.

flight phases

Prelaunch, launch, in orbit, deorbit, entry, landing, and postlanding.

flight types

Payload deployment and retrieval, on-orbit servicing of satellites, and on-orbit operations with an attached payload, as suited to the purposes of a mission. A single flight may include more than one of these purposes.

free-flying system

Any satellite or payload that is detached from the Orbiter during operational phases and is capable of independent operation.

igloo

A pressurized container for Spacelab pallet subsystems when no module is used.

inclination

The maximum angle between the plane of the orbit and the equatorial plane.

instrument pointing subsystem

Spacelab hardware and software for precision pointing and stability for experiment equipment.

integration

A combination of activities and processes to assemble payload and STS components, subsystems, and system elements into a desired configuration, and to verify compatibility among them.

interface

The mechanical, electrical, and operational common boundary between two elements of a system.

interface verification

Testing of flight hardware interfaces by an acceptable method that confirms that those interfaces are compatible with the affected elements of the Space Transportation System.

interim upper stage

Solid propulsive upper stage designed to place spacecraft on high Earth orbits or on escape trajectories for planetary missions.

launch pad

The area at which the stacked Space Shuttle undergoes final prelaunch checkout and countdown and from which it is launched.

launch-readiness verification

The process of ensuring the continuing operational capability of the Space Shuttle system, upper stages, and Spacelab.

launch site support manager

Individual at KSC who is the single point of contact with users in arranging payload processing at the launch site.

Long Duration Exposure Facility

Free-flying reusable satellite designed primarily for small passive or self-contained active experiments that require prolonged exposure to space. It is launched in the Orbiter cargo bay and deployed and retrieved by the remote manipulator system.

manned maneuvering unit

A propulsive backpack device for extravehicular activity. It uses a low-thrust, dry, cold nitrogen propellant.

mission

The performance of a coherent set of investigations or operations in space to achieve program goals. A single mission might require more than one flight, or more than one mission might be accomplished on a single flight.

Mission Control Center

Central area at JSC for control and support of all phases of STS flights.

mission-dependent equipment

Spacelab optional equipment that can be added to a flight if needed for the mission involved.

mission-independent equipment

Spacelab subsystem and support equipment that is carried on every Spacelab flight.

mission kit

Flight kit is the preferred term.

mission specialist

This crewmember is responsible for coordination of overall payload/STS interaction and, during the payload operations phase, directs the allocation of the STS and crew resources to the accomplishment of the combined payload objectives. The mission specialist will have prime

responsibility for experiments to which no payload specialist is assigned, and/or will assist the payload specialist when appropriate.

mission station

Location on the Orbiter aft flight deck from which payload support operations are performed, usually by the mission specialist.

mixed payloads

Cargo containing more than one type of payload.

mobile launch platform

The structure on which the elements of the Space Shuttle are stacked in the Vehicle Assembly Building and are moved to the launch pad.

mobility aid

Handrails or footrails to help crewmembers move about the spacecraft.

module

Pressurized manned laboratory suitable for conducting science, applications, and technology activities.

module exchange mechanism

Part of the Multimission Modular Spacecraft flight support system that is used for servicing.

Multimission Modular Spacecraft

Free-flying system built in sections so that it can be adapted to many missions requiring Earth-orbiting remote-sensing spacecraft. It is launched in the Orbiter cargo bay and deployed and retrieved by the remote manipulator system.

multipurpose support group

Element of the MCC responsible for preflight planning, procedures development, systems expertise, and manpower. During a flight, this group reports systems and trajectory status to the flight control room.

multiuse mission support equipment

Hardware available at the launch site for handling payloads, or common flight hardware used by various payload disciplines.

nadir

That point on the celestial sphere vertically below the observer, or 180° from the zenith.

off-line integration

Assembly of payload elements or multiple payloads that does not involve any STS element.

on-line integration

Mating of payloads with the Orbiter, Spacelab, or upper stage. Level I is with the Orbiter. Level II is with the Spacelab, upper stage, etc.

operations planning

Performing those tasks that must be done to ensure that vehicle systems and ground-based flight control operations support flight objectives.

orbital flight test

One of first six scheduled developmental space flights of the Space Shuttle System.

orbital maneuvering subsystem

Orbiter engines that provide the thrust to perform orbit insertion, circularization, or transfer; rendezvous; and deorbit.

Orbiter

Manned orbital flight vehicle of the Space Shuttle system.

Orbiter Processing Facility

Building near the Vehicle Assembly Building at KSC with two bays in which the Orbiter undergoes postflight inspection, maintenance, and premate checkout prior to payload installation. Payloads are also installed horizontally into the Orbiter in this building.

pallet

An unpressurized platform, designed for installation in the Orbiter cargo bay, for mounting instruments and equipment requiring direct space exposure.

pallet train

More than one pallet rigidly connected to form a single unit.

payload

The total complement of specific instruments, space equipment, support hardware, and consumables carried in the Orbiter (but not included as part of the basic Orbiter payload support) to accomplish a discrete activity in space.

payload canister

Environmentally controlled transporter for use at the launch site. It is the same size and configuration as the Orbiter cargo bay.

payload carrier

One of major classes of standard payload carriers certified for use with the Space Shuttle to obtain low-cost payload operations. The payload carriers are identified as habitable modules (Spacelab) and attached but uninhabitable modules (pallets, free-flying systems, satellites, and upper stages).

payload changeout room

An environmentally controlled room at the launch pad for inserting payloads vertically into the Orbiter cargo bay.

payload discipline training

Preparation of a mission or payload specialist for handling a specific experiment. This training is usually the responsibility of the user.

Payload Operations Control Center

Central area, located at any of three NASA centers, from which payload operations are monitored and controlled. The user, in many instances, will have direct command of a payload from this control center.

payload preparation room

Facility at the Vandenberg Air Force Base launch pad for processing and checking payloads.

payload specialist

This crewmember, who may or may not be a career astronaut, is responsible for the operation and management of the experiments or other payload elements that are assigned to him or her, and for the achievement of their objectives. The payload specialist will be an expert in experiment design and operation.

payload station

Location on the Orbiter aft flight deck from which payload-specific operations are performed, usually by the payload or mission specialist.

payload supplier

Owner/operator of any Space Shuttle payload.

pilot

This crewmember is second in command of the flight and assists the commander as required in the conduct of all phases of Orbiter flight.

planning operations management team

Element of the MCC that performs preflight functions and assists the user in requesting facilities, software, command, telemetry, and flight requirements and POCC interfaces.

principal investigator

Research scientist who is in charge of the conduct of an experiment carried by any STS element.

program

An activity involving manpower, material, funding, and scheduling necessary to achieve desired goals.

racks

Same as experiment racks.

reaction control subsystem

Thrusters on the Orbiter that provide attitude control and three-axis translation during orbit insertion, on-orbit, and reentry phases of flight.

remote manipulator system

Mechanical arm on the cargo bay longeron. It is controlled from the Orbiter aft flight deck to deploy, retrieve, or move payloads.

retrieval

The process of utilizing the remote manipulator system and/or other handling aids to return a captured payload to a stowed or berthed position. No payload is considered retrieved until it is fully stowed for safe return or berthed for repair and maintenance tasks.

simulator

A heavily computer-dependent training facility that imitates flight hardware responses.

solid rocket boosters

Element of the Space Shuttle that consists of two solid rocket motors to augment ascent thrust at launch. They are separated from the Orbiter soon after lift-off and recovered for reuse.

Spacelab

A general-purpose orbiting laboratory for manned and automated activities in near-Earth orbit. It includes both module and pallet sections, which can be used separately or in several combinations.

Space Shuttle

Orbiter, external tank, and solid rocket booster.

space tracking and data network

A number of ground-based stations having direct communications with NASA flight vehicles.

Space Transportation System

An integrated system consisting of the Space Shuttle (Orbiter, external tank, solid rocket booster, and flight kits), upper stages, Spacelab, and any associated flight hardware and software.

spinning solid upper stage

Propulsive upper stage designed to deliver spacecraft of the Delta and Atlas-Centaur classes to Earth orbits beyond the capabilities of the Space Shuttle.

stability rate

The maximum angular rate error during steady state limit cycle operation.

stowing

The process of placing a payload in a retained position in the cargo bay for ascent or return from orbit.

tilt/spin table

Mechanism installed in Orbiter cargo bay that deploys the spinning solid upper stage with its spacecraft.

Tracking and Data Relay Satellite system

Two-satellite communication systems providing principal coverage from geosynchronous orbit for all STS flights.

trainer

A training device or facility that provides primarily a physical representation of flight hardware. It may have limited computer capabilities.

upper stage

Spinning solid upper stage or interim upper stage. Both are designed for launch in the Orbiter cargo bay and have propulsive elements to deliver payloads into orbits and trajectories beyond the capabilities of the Shuttle.

user

An organization or individual requiring the services of the Space Transportation System.

utilization planning

The analysis of approved (funded or committed) payloads with operational resources, leading to a set of firm flight schedules with cargo manifests.

Vehicle Assembly Building

High-bay building near KSC launch pad in which the Shuttle elements are stacked onto the mobile launch platform. It is also used for vertical storage of the external tanks.

Western Launch Operations Division

NASA operation at Vandenberg Air Force Base.

zenith

That point of the celestial sphere vertically overhead. The point 180° from the zenith is called the nadir.

:

APPENDIX D

Acronyms

AMPS	atmosphere, magnetosphere, and plasmas in space
APP	astrophysics payloads
APS	auxiliary power subsystem
APU	auxiliary power unit
ASE	airborne support equipment
ATL	advanced technology laboratory
AWG	American Wire Gauge
BN	ballistic number
CADSI	communications and data systems integration
CITE	cargo integration test equipment
CRT	cathode-ray tube
CSTA	crew software training aid
DOD	Department of Defense
Domsat	domestic satellite
DSN	deep space network
ECS	environmental control system
ESA	European Space Agency
EVA	extravehicular activity
EVAL	Earth-viewing application laboratory
FTS	Federal telecommunications system
GNP	gross national product
GSE	ground-support equipment
GSFC	Goddard Space Flight Center
HRDR	high rate digital recorder
HRM	high rate multiplexer
IMU	inertial measurement unit
IPS	instrument pointing subsystem
IUS	interim upper stage
JPL	Jet Propulsion Laboratory
JSC	Lyndon B. Johnson Space Center
KSC	John F. Kennedy Space Center
LaRC	Langley Research Center
LDEF	Long Duration Exposure Facility
LSSM	launch site support manager
MCC	Mission Control Center (at JSC)
MMS	Multimission Modular Spacecraft
MSFC	Marshall Space Flight Center

NA	not applicable
NASCOM	NASA communications network
OMS	orbital maneuvering subsystem
OPF	Orbiter Processing Facility (at KSC)
ORB 1-g	Orbiter one-g trainer
OV	Orbiter vehicle
PCR	payload changeout room (at launch site)
POCC	Payload Operations Control Center
POMT	planning operations management team
POP	perpendicular to orbit plane
RAU	remote acquisition unit
RCS	reaction control subsystem
RIU	remote interface unit
RMS	remote manipulator system
SAEF-1	Spacecraft Assembly and Encapsulation Facility no. 1
SIPS	small instrument pointing system
SLS	Spacelab simulator (at JSC)
SMS	Shuttle mission simulator (at JSC)
SPP	solar physics payloads
SSUS	spinning solid upper stage
SSUS-A	spinning solid upper stage for Atlas-Centaur class spacecraft
SSUS-D	spinning solid upper stage for Delta class spacecraft
STDN	space tracking and data network
STS	Space Transportation System
TDRSS	Tracking and Data Relay Satellite system
TEMS	transport environment monitoring system
VAB	Vehicle Assembly Building (at KSC)
VAFB	Vandenberg Air Force Base
X_L	X-axis of Spacelab
X_o	X-axis of Orbiter
X_p	X-axis of payload
Y_L	Y-axis of Spacelab
Y_o	Y-axis of Orbiter
Y_p	Y-axis of payload
Z_L	Z-axis of Spacelab
Z_o	Z-axis of Orbiter
Z_p	Z-axis of payload

Acceleration, 2-6, 2-8, 2-14
 — LDEF, 2-83
 Acronyms, D-1 to D-3
 Advanced technology laboratory, 2-71 to 2-73
 Aft flight deck, Orbiter, 2-20, 2-22, 2-42, 2-58, 2-65 and 2-66
 Airlock, 2-34, 2-36, 2-45, 2-50
 — For experiments, 2-51 to 2-53
 Application
 — Form STS 100, B-3 and B-4
 — SEE ALSO specific term for scientific applications
 Astrophysics experiments, 2-65 and 2-66
 Atlas-Centaur class payloads, 2-79 to 2-81
 — Charges, 1-8
 Atmosphere experiments, 2-68 to 2-71
 Atmospheric drag, 2-6 and 2-7
 Attached payloads
 — POCC, 4-16 and 4-17
 — Telemetry, 4-11
 — SEE ALSO Spacelab
 Attitude
 — Orbiter hold, 2-11 to 2-13
 — Orientation, 2-6 to 2-8
 — Spacelab payload, 2-58 and 2-59
 Automated payloads, SEE Free-flying satellites
 Avionics SEE Communications
 Biology experiments, 2-76 to 2-78
 Broadband emissions, 2-17 and 2-18
 Cargo bay, 2-10 and 2-11, 2-15 and 2-16, 2-19 to 2-21, 2-23, 2-27 to 2-29, 2-46, 3-4 and 3-5, 3-8, 3-11 and 3-12
 Cargo bay liner, 2-11, 2-23
 Cargo integration review, 1-1, 1-4
 Cargo integration test equipment, SEE Payload integration; Interface verification
 Center of gravity
 — Orbiter, 2-23 and 2-24
 — Spacelab, 2-46
 Charges, user, 1-5 to 1-8, 1-10
 Column density, 2-16
 Commander, SEE Crewmembers
 Communications, 2-25, 4-7 to 4-12
 — Deep space network, 4-7, 4-20 and 4-21
 — Domsat, 4-7, 4-10
 — Multimission Modular Spacecraft, 2-90, 2-92
 — NASCOM, 4-7, 4-10

Communications (CONTINUED)
 — POCC's, 4-17 and 4-18
 — Spacelab, 2-62 and 2-63, 2-70
 — Space tracking and data network, 4-7, 4-10, 4-19
 — Tracking and Data Relay Satellite system, 4-7 to 4-9, 4-11
 — Telemetry, 4-11
 Consumables, SEE Flight kits; Power
 Contamination, 2-16
 Coordinates
 — Axes, 2-6
 — Orbiter, 2-20
 — Payload, 2-21
 — Spacelab, 2-46
 Core segment, SEE Module
 Crew activity planning, 4-1, 4-4
 Crewmembers, 4-22 to 4-28
 Cryogenics
 — Launch site, 3-4, 3-25
 Data management, SEE Mission Control Center; Payload Operations Control Center; Communications
 Deep space network, 4-7, 4-20 and 4-21
 Delta class payloads, 2-79 to 2-81
 — Charges, 1-8
 Department of Defense, 1-5, 2-82, 3-25 to 3-27
 Deployment, 2-26
 Domsat, 4-7, 4-10
 Earth resources experiments, 2-74 and 2-75
 Earth-viewing application laboratory, 2-74 and 2-75
 Electromagnetic compatibility, 2-17 and 2-18
 Environmental control, 2-32 and 2-33
 — Spacelab, 2-48, 2-62
 European Space Agency, 1-1, 2-41, 3-5
 Exceptional program, 1-5
 Experiment segment, SEE Module
 Extravehicular activity, 2-19, 2-34 to 2-36, 2-45, 2-50, 4-23 and 4-24
 Flight assignment, 1-1, 1-4, 4-1, B-3 and B-4
 Flight control team, SEE Mission Control Center
 Flight data file, SEE Crew activity planning
 Flight design, 4-1, 4-3
 Flight kits, 1-3, 1-7, 1-10, 2-19, 2-34, 3-10, 4-3
 Flight manifest, 1-4, 4-2
 Flight phases, standard, 1-3, 4-1

Flight planning, 4-1 to 4-6
 Flight schedules, SEE Schedules
 Flight types, standard, 1-3, 4-1
 Form
 — Request for flight assignment, 1-1, 1-4, B-3 and B-4
 Free drift, 2-6 and 2-7
 Free-flying satellites, standard, 1-2, 3-2, 4-11 and 4-12
 — POCC, 4-18 and 4-19
 — Telemetry, 4-11 and 4-12
 Glossary, C-1 to C-6
 Goddard Space Flight Center, SEE NASA Goddard Space Flight Center
 Ground-support equipment, 3-16, 3-18 and 3-19
 Ground turnaround, 3-3, 3-11 and 3-12
 Hazardous operations, SEE Safety
 Heat rejection, 2-32 and 2-33
 — Radiators, 2-11, 2-33
 — Spacelab, 2-62
 Igloo, SEE Pallet
 Inclination limits
 — From KSC, 2-2 and 2-3
 — From VAFB, 2-4 and 2-5
 Instrument pointing subsystem, 2-58 and 2-59
 Interfaces
 — Human, 1-1, 3-23
 — Payload, 2-19, 2-28 to 2-31
 — To pad, 3-4, 3-8
 — SEE ALSO Launch site
 Interface verification, 2-37 to 2-39, 3-3 and 3-4, 3-20 and 3-21
 Interim upper stage, SEE Upper stages
 Jet Propulsion Laboratory, 4-15, 4-20 and 4-21
 John F. Kennedy Space Center, SEE Launch site
 Johnson Space Center, SEE NASA Lyndon B. Johnson Space Center
 Kennedy Space Center, SEE Launch site
 Landing site, 3-1, 3-10
 Langley Research Center, SEE NASA Langley Research Center
 Launch pad, 3-4, 3-8 and 3-9, 3-14 and 3-15
 Launch-readiness verification, 1-4
 Launch schedule, 1-9, B-5 and B-6
 Launch site, 2-2 to 2-5, 2-39, 2-86, 3-1 to 3-27
 Life sciences experiments, 2-76 to 2-78

- Limit load factors, 2-14
- Long Duration Exposure Facility, 2-83 to 2-87
 - SEE ALSO Free-flying satellites
- Magnetic fields, 2-18 and 2-19
- Magnetosphere experiments, 2-68 to 2-71
- Marshall Space Flight Center, SEE NASA George C. Marshall Space Flight Center
- Mass, 1-7
 - And orbit, 2-2 to 2-5
 - Spacelab, 2-44 and 2-45
 - Spacelab airlock, 2-51
- Meteorology experiments, 2-74 and 2-75
- Mission Control Center, 4-7, 4-10, 4-12 to 4-16, 4-19
- Mission specialist, SEE Crewmembers
- Module, Spacelab, 2-41 to 2-43, 2-47 to 2-55
- Multimission Modular Spacecraft, 2-89 to 2-94
 - Flight support system, 2-90, 2-93 and 2-94
 - SEE ALSO Free-flying satellites
- Narrowband emissions, 2-17 and 2-18
- NASA Ames Research Center, 2-78
- NASA George C. Marshall Space Flight Center, 2-64
- NASA Goddard Space Flight Center, 2-75, 2-91, 4-10, 4-15, 4-18 and 4-19
- NASA Headquarters STS Operations Office, 1-1, 1-4
- NASA John F. Kennedy Space Center, SEE Launch site
- NASA Langley Research Center, 2-83, 2-86 and 2-87
- NASA Lyndon B. Johnson Space Center, 2-38, 2-39, 2-78, 4-13, 4-15 to 4-17
- NASCOM, 4-7, 4-10
- Oceanography experiments, 2-74 and 2-75
- Operations planning, 4-1, 4-6
- Optical window, Spacelab, 2-51, 2-54 and 2-55
- Orbit, 2-2 to 2-7, 4-8 and 4-9
 - Long Duration Exposure Facility, 2-83
 - Physics experiments, 2-66 and 2-67
 - Upper stages, 2-81 and 2-82
- Orbital maneuvering subsystem, 2-2 to 2-5
- Orbit inclination, 1-7, 2-2 to 2-5
 - And communication, 4-8
 - SEE ALSO specific satellites
- Orbiter Processing Facility, 3-2, 3-4 and 3-5, 3-10, 3-14 and 3-15
- Pallet, 2-41 to 2-44, 2-56 and 2-57
- Patents, 1-9
- Payload accommodations, 2-19 to 2-36
- Payload canister, 3-6 to 3-9, 3-18 and 3-19
- Payload carrier, SEE name of specific system
- Payload changeout room, 3-2, 3-7 to 3-9, 3-15
- Payload envelope, 2-20 to 2-22
 - Center of gravity, 2-23 and 2-24
 - Spacelab module, 2-43, 2-48 to 2-50
 - Spacelab airlock, 2-51 and 2-52
 - Spacelab pallet, 2-57
- Payload handling
 - In transit, 3-3, 3-16 and 3-17
 - Launch and landing site, 3-2 to 3-27
 - On orbit, 2-26 and 2-27
- Payload integration, 3-3 to 3-5, 3-20 and 3-21
- Payload mass limit, SEE Mass
- Payload mission plan, 1-7, 4-1
- Payload Operations Control Center, 1-10, 4-7, 4-10, 4-12 to 4-21
 - Attached payloads, 2-42, 2-65 and 2-66, 2-75, 2-76, 4-16 and 4-17
 - Free-flying payloads, 4-18 and 4-19
 - Planetary payloads, 4-20 and 4-21
 - Training, 4-29
- Payload specialist, 2-65, 2-67, 2-76, 4-22 to 4-24
 - Training, 4-26 to 4-28
- Payload transportation, 3-3, 3-16 and 3-17
- Physics experiments, 2-65 to 2-71
- Pilot, SEE Crewmembers
- Planetary payloads, 2-82, 4-20 and 4-21
- Planetary pioneer, SEE Upper stages
- Plasmas-in-space experiments, 2-68 to 2-71
- Pointing, payload, 2-8, 2-45
 - Instrument pointing subsystem, Spacelab, 2-58 and 2-59
 - Small instrument pointing system, 2-65 and 2-66
- Power, 2-17, 2-19, 2-30 and 2-31
- Power (CONTINUED)
 - Spacelab, 2-57, 2-61 and 2-62
- Pressure
 - Cargo bay, 2-15
 - Pressurization and safety, 3-25
- Prices SEE Charges
- Propellants, 3-25
- Proprietary data, 1-9
- Propulsion stage, SEE Upper stages
- Purging, ground, 2-11
- Radiation, 3-25
- Reaction control subsystem, 2-2 to 2-4
- References, A-1 to A-5
- Remote manipulator system, 2-19, 2-26, 2-82, 2-83, 2-90 and 2-91
- Remote-sensing experiments, 2-64 to 2-75, 2-89 to 2-92
- Retrieval, 2-26
- Return flux, 2-16
- Safety, 2-37
 - Launch site, 3-25
- Schedules, 1-4, 1-6, 1-9, 2-86 and 2-87, 4-2, B-5 and B-6
 - Launch site, 3-2, 3-23 and 3-24
 - SEE ALSO Flight planning
- Shock, landing, 2-14
- Simulators, 2-39, 4-24 and 4-25
- Small payloads, 1-8
- Solar physics experiments, 2-66 and 2-67
- Spacelab, 1-2, 2-19, 2-41 to 2-78
 - Configurations, 2-43 and 2-44, B-2
 - Ground flow, 3-5
 - Transporting racks and pallets, 3-3
- Space processing, 2-64
- Space tracking and data network, 4-7, 4-10, 4-19
- Spinning solid upper stage, SEE Upper stages
- Systems, standard, 1-2, B-2
 - SEE ALSO individual system names
- Telemetry, SEE Communications
- Terms and conditions, 1-9
- Thermal control, 2-11 to 2-13
- Tilt/spin table, 2-26, 2-80 and 2-81, 3-7
- Titan class payloads
 - Charges, 1-8
- Tracking, SEE Communications
- Tracking and Data Relay Satellite system, 4-7 to 4-9, 4-11
- Training, 4-22 to 4-29
- Training preparation, 4-1, 4-6
- Transfer tunnel, 2-34, 2-41, 2-50

Upper stages, 1-2, 1-10, 2-79 to 2-82

— Ground flow, 3-6 to 3-9

— Interim upper stage, 2-82

— Spinning solid upper stage, 2-80 and 2-81

— Telemetry, 4-12

U.S. Air Force, SEE Department of Defense; Vandenberg Air Force Base

User

— Class of, 1-5, 1-10

— Flight planning 4-1 to 4-6

— Interface to STS operations, 1-1

— Launch site responsibilities, 3-24

— Training responsibilities, 4-24 and 4-25

Users' guides, 1-1, A-1 to A-5

Utility connections, Spacelab, 2-60

Utilization planning, 4-1 and 4-2

Vandenberg Air Force Base, 3-26 and 3-27, 2-4 and 2-5

— SEE ALSO Launch site

Vehicle Assembly Building, 3-2, 3-4, 3-14 and 3-15

Venting, 2-15 and 2-16

Vibration, 2-9

Viewport, SEE Optical window

Volume, SEE Payload envelope

Weight, SEE Center of gravity; Mass